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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,198	12/28/2001	Chris Rich	WVFRNT.001A	2841

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EXAMINER

ANGEBRANNDT, MARTIN J

ART UNIT

PAPER NUMBER

1756

DATE MAILED: 09/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/036,198

Applicant(s)

RICH ET AL.

Examiner

Martin J Angebrannt

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-108 is/are pending in the application.
- 4a) Of the above claim(s) 60-98 and 100-108 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-59 and 99 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-108 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-59 and 99, drawn to processes of contact copying relief diffractive articles to form volume phase diffractive articles, classified in class 430, subclass 321.
  - II. Claim 60-98 and 100-108, drawn to a volume diffractive element having a surface relief, classified in class 359, subclass 3.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions group I and group II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the article may be made using partial development of a conventional interferometric exposure or contact exposure with a non-relief surface of a diffractive article.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.
5. During a telephone conversation with Mark Gallagher on September 2, 2003 a provisional election was made with traverse to prosecute the invention of group I, claims 1-59 and 99. Affirmation of this election must be made by applicant in replying to this Office action.

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Claims 60-98 and 100-108 withdrawn from further consideration by the examiner, 37

CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

7. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7b Claims 6,7 and 24 are rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility.

With respect to claim 6, relief diffractive articles rely upon the variations in optical thickness to achieve diffraction. The optical thickness is the product of the refractive index and the physical thickness. In the case of purely relief diffractive articles, the refractive index is the same throughout the medium and therefore the only difference is the physical thickness of adjacent areas. If this surface is placed in contact with a material having the same refractive index as the layer having the relief image, the interface is hidden (think of optical index matching fluids) and the light passes through undiffracted. Generally if you cannot see the interface, then the light also cannot. (See Kler et al. '075 and Mallik '466 where the diffractive image only becomes visible when the two layers having the same refractive index are separated and by

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inference the teachings of Takeuchi et al. '857 that the refractive index of any coating should be different from that of the hologram layer itself (7/4-18))

With respect to claims 7 and 24, the curing step of claim 7 and 24 require energy from heat, electron beams or corona charging to pass through the surface relief pattern, to be modulated pattern-wise by the surface relief pattern and to cure the curable material. Materials used to form holograms and similar diffractive articles (ethylenically unsaturated monomers, such as acrylates and vinyl monomers) are curable by light, heat and electron beam. The heat can pass through the relief layer, but is not patterned by the relief surface. Electrons and other electric charges can neither pass through the layer bearing the relief image or be patterned by the relief surface.

The examiner recommends canceling these claims and their embodiments.

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 6,7 and 24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

See the discussion above in paragraph 7b.

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1,2,4,5,8,10,11,12,18,32,34,41-48 and 99 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Shirasaki et al. '442.

Shirasaki et al. '442 describes with respect to figure 25, contacting the phase shifted phase grating mask with a photoresist layer and exposure through the mask with an s-polarized laser to record the pattern in the resist. (17/47-57). The exposed resist before development meets the claims (see Haugh '526, describing the "elimination of such post-exposure steps as developing or fixing" to form a volume hologram on page 7 of copy submitted by the applicant/paragraph 3)

13. Claims 1,2,4,5,8,10,11,12,18,32,34,41-48 and 99 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Okai et al. '637.

Okai et al. '637 describes with respect to figure 25, contacting the relief absorption grating mask with a photoresist layer and exposure through the mask with an s-polarized laser to record the pattern in the resist in figure 8. (6/45-55). The exposed resist before development meets the claims (see Haugh '526, describing the "elimination of such post-exposure steps as developing or fixing" to form a volume hologram on page 7 of copy submitted by the applicant/paragraph 3, in patent document col. 8/lines 44-63)

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14. Claims 1,2,4,5,8,10,11,12,18,32,34,41-48 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. '033, in view of Moss et al. '417.

Ikeda et al. '033 teach the formation of a master volume phase hologram by exposing a silver halide film, processing it to form an absorption hologram and then bleaching it (1/10-40). The use of proximity exposure of contact exposure through the holographic master (12) and into the photosensitive layer (14) is disclosed with respect to figure 5. (4/51-5/2 and 7/43-8/6). Example 2 uses a volume phase hologram as the master (4) and is coated with the polyvinyl carbazole photoresist layer and a reflection type exposure is used to form a phase type hologram. The term "phase hologram" in the reference described holograms with refractive index fringes formed in the photosensitive layer (3/38-40) which is the same as a volume hologram.

Moss et al. '417 teach that volume holograms have both modulation on the surface (surface relief or thin holograms) and fringes of refractive index modulation throughout the thickness (thick holograms) (2/8-54).

It would have been obvious to one skilled in the art to modify the process of figure 5 to use a phase holographic master based upon the disclosure of the use of volume phase holographic masters in example 2 and in column 1 of Ikeda et al. '033 and the master hologram would inherently have a relief pattern corresponding to the refractive index modulated fringes where they intersect the surface of the volume holographic master based upon the teachings of Moss et al. '417.

15. Claims 1-5,8,10-12,18-23,31,32,34,41-53 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. '033 and Haugh '526, in view of Moss et al. '417.

Haugh '526 teaches the previous use of silver halide and conventional resist materials such as dichromated gelatin or the like have disadvantages in that extensive post processing is required and the silver halide materials are relatively expensive. (col. 2/lines 29-65). The use of free radically polymerizable materials, such as acrylates, is disclosed throughout (3/22-6/25). The use of contact copying methods where the radiation passes through the master is disclosed. (6/6/57-75) The use of various light sources in making copies, including UIV sources such as arc or vapor lamps is disclosed. (7/15-27). The image produced during the exposure does not require post processing (8/43-63). When contact is close (0.001 in) then resolution is not lost when using an incoherent source (7/58-69). The examples use contact copying processes, with example XXXII using a mercury lamp. The use of a non-imagewise exposure after forming the holographic image and may improve the quality of the hologram. (9/40-52).

It would have been obvious to one skilled in the art to modify the process of Ikeda et al. '033 by using the holographic materials and resulting holograms of Haugh '526 as both the volume phase master hologram and the photosensitive materials in the contact procedure of Ikeda et al. '033 to gain the advantage of the using the more easily processed media or alternatively it would have been obvious to modify the process of Haugh '526 by using the holographic materials and resulting holograms of Haugh '526 as both the volume phase master hologram and the photosensitive materials in the contact procedure of Haugh '526 based upon the teachings of Ikeda et al. '033 the use of volume phase holographic masters to gain the advantage of the using the more easily processed media. Moss et al. '417 teaches that volume phase holograms would inherently have a relief pattern corresponding to the refractive index modulated fringes where they intersect the surface of the volume holographic master.

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16. Claims 1-5,8-12,18-23,31,32,34,41-53 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. '033 and Haugh '526, in view of Moss et al. '417 and further in view of Molteni et al. '853.

Molteni et al. '853 teach the use of a transmission hologram mounted on a transparent cylinder with light irradiated through the master and onto a photosensitive member with respect to figure 1 which allows rapid contact copying. (6/39-8/9) The formation of various holographic articles, including diffusers and gratings, is disclosed. (3/48-51). The use of various holographic materials is disclosed. (9/46-62). The use of the materials found in 5,198,912 (Ingwall et al. '912) is disclosed. (13/2-11).

In addition to the basis provided above, the examiner holds that it would have been obvious to one skilled in the art to modify the process of Ikeda et al. '033 and Haugh '526 as combined with Moss et al. '417 discussed above by using a photopolymeric master which is wrapped around a transparent cylinder as taught by Molteni et al. '853 to increase the productivity of the process. (ie. from a batch/ freeze-frame) methods to a continuous method).

17. Claims 1-5,8,10-12,18-23,31,32-34,41-53 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. '033 and Haugh '526, in view of Moss et al. '417 and further in view of Moraw et al. '633.

Moraw et al. '633 teach contact copying from two different masters in to a single holographic recording material (examples 1-3 and 2/42-48).

In addition to the basis provided above, the examiner holds that it would have been obvious to one skilled in the art to modify the process of Ikeda et al. '033 and Haugh '526 as combined with Moss et al. '417 discussed above by repeating the process to multiplex (store

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several) holograms recorded in the medium to allow different colored holograms or merely increase the information content of the recording layer as taught in Moraw et al. '633.

Claims 1-5,8-23,25-59 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. '033 and Haugh '526, in view of Moss et al. '417, Ingwall et al. '912 and Sutherland et al. WO 01/90822.

Ingwall et al. '912 (discussed in Molteni et al. '853) teaches coating photopolymerizable acrylic/acrylate materials onto indium tin oxide (ITO) coated glass substrates, exposing and fixing the holograms with a UV exposure followed by filling the voids in the hologram with liquid crystal materials (example 1, 4/6-5/55). Example 2 further coats these with an alignment layer coated on a ITO coated glass plate, which allows the application of a voltage to control the diffraction efficiency of the hologram. (5/59-6/2). The use of in-situ polymerization of compositions containing liquid crystals and polymeric precursors is disclosed as known as polymer dispersed liquid crystal materials (PDLC). (1/37-53)

Sutherland et al. WO 01/90822 teach contact exposure of PDLC materials with respect to figure 4. The master may be various hologram types including thin, volume, surface and multiplexed holograms (page 21/ line 31-page 22/line 32). Post recording processing , including exposure is disclosed. (24/3-9). Useful PDLC compositions include the LC mixture E7. (16/15-27).

In addition to the basis provided above, the examiner holds that it would have been obvious to one skilled in the art to modify the process of Ikeda et al. '033 and Haugh '526 as combined with Moss et al. '417, by using contact exposure of the master with a PDLC composition such as that disclosed by Sutherland et al. WO 01/90822 to facilitate forming a

electronically variable diffraction efficiency in the holographic medium, coated in a ITO/glass plate laminate and followed by providing the exposed side with an ITO coated glass plate as taught by Ingwall et al. '912 to remove the need to fill the voids with LC material required with the compositions of Ingwall et al. '912 and to improve the degree of contact between the master and the recording material, thus allowing UV or incoherent sources to be used in the copying process as taught by Haugh '526.

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sawyer '719, Duthie et al. '192 and Horner et al. '630 all relate to contact copying of holograms.

Ingwall et al. WO 88/04796 is the WIPO equivalent of an application referred to in Ingwall et al. '912 and relates to filling voids in holograms with various materials.

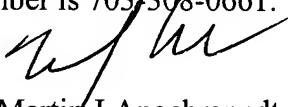
19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebrannndt whose telephone number is 703-308-4397. The examiner can normally be reached on Mondays-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308-0661.



Martin J Angebranndt  
Primary Examiner  
Art Unit 1756

September 10, 2003